

WHAT IS CLAIMED IS:

1. An imaging device comprising:

an imaging unit having a photoelectric converter for
5 converting an optical image into electric signal;

an optical unit for forming an optical image of a
subject on the photoelectric converter, the optical unit
comprising a lens and a lens frame which supports the lens
and has a hanger shaft hole;

10 a chassis on which the imaging unit is mounted and a
hanger shaft is integrally formed, the hanger shaft being
fit into the hanger shaft hole to support the lens frame so
that the lens frame is capable of moving in an optical axis
direction; and

15 a drive unit for actuating the lens frame of the
optical unit in the optical axis direction, and

wherein the hanger shaft has a plurality of diameters
so that the chassis side of the hanger shaft is largest and
the side apart from the chassis becomes small, and

20 wherein the hanger shaft hole has a plurality of
diameters which fit to the hanger shaft.

2. An imaging device as claimed in claim 1, wherein
the hanger shaft has a first diameter and a second diameter
25 smaller than the first diameter, and

wherein the hanger shaft hole has a third diameter that fits to the first diameter of the hanger shaft and a fourth diameter that is smaller than the third diameter and fits to the second diameter of the hanger shaft.

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3. An imaging device as claimed in claim 1, wherein the hanger shaft has a taper between portions having different diameters.

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4. An imaging device as claimed in claim 3, wherein the hanger shaft hole has a taper between portions having different diameters.

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5. An imaging device as claimed in claim 1, wherein the hanger shaft has a step between portions having different diameters.

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6. An imaging device as claimed in claim 5, wherein the hanger shaft hole has a step between portions having different diameters.

7. An imaging device as claimed in claim 2, wherein the hanger shaft has a fifth diameter between portions having the first diameter and the second diameter, and

wherein the fifth diameter is smaller than the first diameter and larger than the second diameter.

8. An imaging device as claimed in claim 7, wherein the hanger shaft hole has a sixth diameter between portions having the third diameter and the fourth diameter, and wherein the sixth diameter is smaller than the third diameter and larger than the fourth diameter.

9. An imaging device as claimed in claim 1, wherein the hanger shaft is provided in a projected area of the imaging unit in the optical axis direction.

10. An imaging device as claimed in claim 1, further comprising:

a detector for detecting a position of at least part of the optical unit with respect to the optical axis direction, and

wherein at least either of the drive unit and the detector are provided in a projected area of the imaging unit in the optical axis direction.

11. An imaging device as claimed in claim 10, wherein the drive unit comprises:

a motor having a drive shaft perpendicular to the optical axis of the optical unit; and

a conversion mechanism for converting a rotational motion of the drive shaft into a linear motion in the optical axis direction.

12. An imaging device as claimed in claim 11, wherein the conversion mechanism comprises:

a driving gear provided on the drive shaft of the motor; and

a cam gear meshing with the driving gear, having a cam surface with which a cam follower formed on an extension of the optical unit is in pressure contact, and having a shaft parallel to the optical axis of the optical unit, and

wherein at least part of the cam gear is provided in the projected area of the imaging unit in the optical axis direction.

13. A portable equipment comprising the imaging device as claimed in claim 1.

14. An imaging device as claimed in claim 13, wherein the hanger shaft has a first diameter and a second diameter smaller than the first diameter, and

wherein the hanger shaft hole has a third diameter that fits to the first diameter of the hanger shaft and a fourth diameter that is smaller than the third diameter and fits to the second diameter of the hanger shaft.

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15. An imaging device as claimed in claim 13, wherein the hanger shaft has a taper between portions having different diameters.

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16. An imaging device as claimed in claim 15, wherein the hanger shaft hole has a taper between portions having different diameters.

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17. An imaging device as claimed in claim 13, wherein the hanger shaft has a step between portions having different diameters.

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18. An imaging device as claimed in claim 17, wherein the hanger shaft hole has a step between portions having different diameters.

19. An imaging device as claimed in claim 14, wherein the hanger shaft has a fifth diameter between portions having the first diameter and the second diameter, and

wherein the fifth diameter is smaller than the first diameter and larger than the second diameter.

20. An imaging device as claimed in claim 19, wherein
5 the hanger shaft hole has a sixth diameter between portions having the third diameter and the fourth diameter, and wherein the sixth diameter is smaller than the third diameter and larger than the fourth diameter.

10 21. An imaging device as claimed in claim 13, wherein the hanger shaft is provided in a projected area of the imaging unit in the optical axis direction.

22. An imaging device as claimed in claim 13, further
15 comprising:

a detector for detecting a position of at least part of the optical unit with respect to the optical axis direction, and

20 wherein at least either of the drive unit and the detector are provided in a projected area of the imaging unit in the optical axis direction.

23. An imaging device as claimed in claim 22, wherein the drive unit comprises:

a motor having a drive shaft perpendicular to the optical axis of the optical unit; and

a conversion mechanism for converting a rotational motion of the drive shaft into a linear motion in the optical axis direction.

24.. An imaging device as claimed in claim 23, wherein the conversion mechanism comprises:

a driving gear provided on the drive shaft of the motor; and

a cam gear meshing with the driving gear, having a cam surface with which a cam follower formed on an extension of the optical unit is in pressure contact, and having a shaft parallel to the optical axis of the optical unit, and

wherein at least part of the cam gear is provided in the projected area of the imaging unit in the optical axis direction.